AMENDMENTS TO THE CLAIMS:

Please cancel without prejudice claims 5, 11 and 40-43 and amend claims 1, 6, 12, 14 and 18 as follows.

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (currently amended) A magnetic field sensor device comprising:

an oscillatory member;

a sensor for providing an output signal dependent on the deflection of the oscillatory member;

a driver configured to impart a magnetic field independent oscillatory force to the oscillatory member; and

a current controller, wherein the current controller is arranged to pass an alternating current (AC) along at least first and second current paths provided through the oscillatory member, ~~characterised in that~~wherein the current controller is ~~arranged~~configured to supply a current flow through the first current path that is in substantially the opposite direction to current flow through the second current path to provide magnetic gradiometer mode operation wherein the first and second current paths are arranged to provide counteracting Lorentz forces to the oscillatory member when in the presence of a uniform magnetic field~~in which current flow through the first current path is in substantially the opposite direction to current flow through the second current path~~.

2. (previously presented) A device according to claim 1 wherein the current controller is arranged to additionally provide magnetometer mode operation in which current flow through the first current path is in substantially the same direction as current flow through the second current path.

3. (previously presented) A device according to claim 1 wherein the current controller is arranged to additionally provide magnetometer mode operation in which AC is passed through only the first current path.

4. (previously presented) A device according to claim 2 wherein the current controller comprises a mode selector for switching to either one of gradiometer mode and magnetometer mode as required.

5. (cancelled).

6. (currently amended) A device according claim ~~5~~1 wherein the sensor comprises at least one sensor electrode located on ~~the~~a substrate and having a variable capacitance with the oscillatory member.

7. (previously presented) A device according to claim 6 wherein the sensor comprises a plurality of elongate sensor electrodes located on the substrate and the oscillatory member comprises a plurality of elongate electrodes interdigitated with said plurality of elongate sensor electrodes.

8. (original) A device according to claim 7 wherein the electrodes of the oscillatory member are maintained at a predetermined direct current (DC) polarisation voltage.

9. (original) A device according to claim 7 wherein a high frequency AC polarisation voltage is applied to the electrodes of the oscillatory member.

10. (previously presented) A device according to claim 7 wherein said plurality of sensor electrodes are electrically connected to form two electrode sets, the two electrode sets being arranged to provide differential capacitive pick-off.

11. (cancelled).

12. (currently amended) A device according to claim ~~11~~1 wherein the oscillatory member is carried on a substrate and the driver comprises at least one drive electrode formed on the substrate to electrostatically impart the oscillatory force to the oscillatory member.

13. (previously presented) A magnetometer according to claim 12 in which the driver comprises a plurality of first elongate drive electrodes formed on the substrate and the oscillatory member comprises a plurality of second elongate drive electrodes, wherein the first elongate drive electrodes are interdigitated with the second elongate drive electrodes.

14. (currently amended) A device according to claim ~~11~~ 1 wherein the driver comprises a positive feedback circuit for receiving the output signal produced by the sensor.

15. (previously presented) A device according to claim 14 wherein the driver provides an oscillatory force of fixed amplitude.

16. (previously presented) A device according to claim 14 in which the driver is arranged to impart an oscillatory force to the oscillatory member of adjustable amplitude, wherein the amplitude of the oscillatory force applied by the driver is adjusted during use so as to maintain a given amplitude of oscillation of the oscillatory member.

17. (previously presented) A device according to claim 1 wherein the frequency of the AC passed through the oscillatory member by the current controller is substantially equal to the resonant frequency of the oscillatory member.

18. (currently amended) A device according to claim ~~5~~ 1 wherein the current controller comprises a voltage source for supplying the AC passed through the oscillatory member.

19. (previously presented) A device according to claim 18 wherein the current controller comprises a feedback circuit arranged to receive the output signal produced by the sensor.

20. (previously presented) A device according to claim 1 wherein the first and second current paths of the oscillatory member comprise substantially straight conductive tracks.

21. (original) A device according to claim 20 wherein the conductive track forming the first current path is substantially parallel to the conductive path forming the second current path

22. (previously presented) A device according to claim 1 wherein the length of the first current path through the oscillatory member is substantially equal to the length of the second current path through the oscillatory member.

23. (previously presented) A device according to claim 1 wherein the first current path through the oscillatory member is spatially separated from the second current path through the oscillatory member by more than 5mm.

24. (previously presented)A device according to claim 1 wherein the oscillatory member comprises at least first and second flexible leg portions, the first leg portion comprising a conductive portion defining the first current path and the second leg portion comprising a conductive portion defining the second current path.

25. (original) A device according to claim 24 wherein the oscillatory member comprises a substantially rigid cross-beam, a first end of the crossbeam being attached to the first flexible leg portion and the second end of the crossbeam being attached to the second flexible leg portion.

26. (original) A device according to claim 25 wherein one or more additional flexible leg portions are attached to the crossbeam.

27. (previously presented) A device according to claim 25 wherein one or more elongate electrodes protrude from the cross-beam.

28. (previously presented) A device according to claim 25 wherein the cross beam is maintained at a given polarisation voltage during use.

29. (previously presented) A device according to claim 1 wherein the oscillatory member comprises at least one stress reliever.

30. (cancelled)

31. (previously presented) A device according to claim 1 formed as a micro-electromechanical system (MEMS).

32. (previously presented) A device according to claim 1 wherein the oscillatory member is suspended on a substrate.

33. (original) A device according to claim 32 wherein the oscillatory member is arranged to oscillate along an axis in a plane substantially parallel to the plane of the substrate.

34. (previously presented) A device according to claim 32 wherein the substrate and oscillatory member are formed from any one of a silicon-on-insulator (SOI) wafer and a silicon-on-glass (SOG) wafer.

35. (previously presented) A compass comprising at least one magnetic field sensor device according to claim 1.

36. (previously presented) A compass comprising at least one magnetic field sensor device according to claim 4.

37. (original) A compass according to claim 36 comprising three magnetic field sensing devices, each of the three magnetic field sensing devices being arranged to acquire magnetic field measurements along mutually orthogonal axes.

38. (previously presented) A compass according to claim 37 and further comprising a processor, the processor being arranged to switch each magnetic field sensor device between magnetometer mode and gradiometer mode as required and to determine therefrom a compass bearing that is corrected for any localised magnetic field anomalies.

39. (previously presented) An inertial measurement unit comprising a compass according to claim 35.

40. (cancelled).

41. (cancelled).

42. (cancelled).

43. (cancelled).